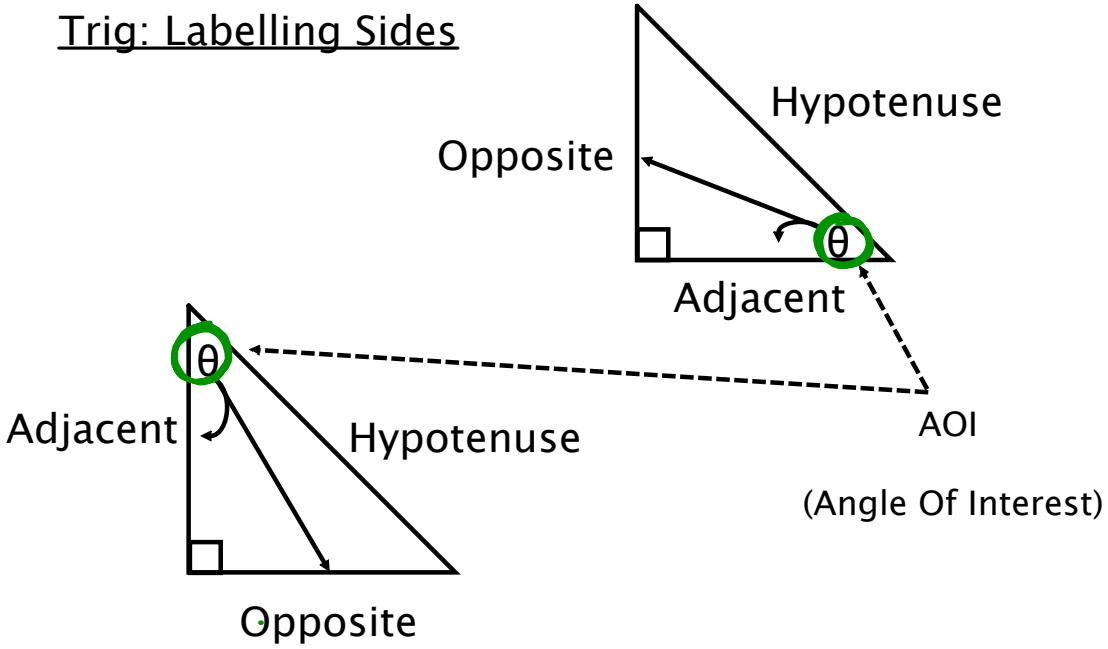
# 5.3 (7.5) - Solving Right Triangles

Trig: Labelling Sides

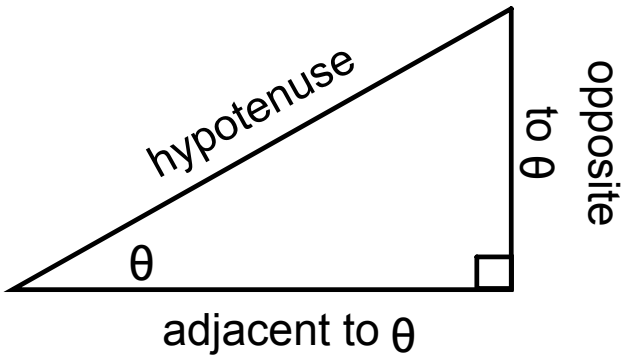



Three (3) primary trigonometric ratios.

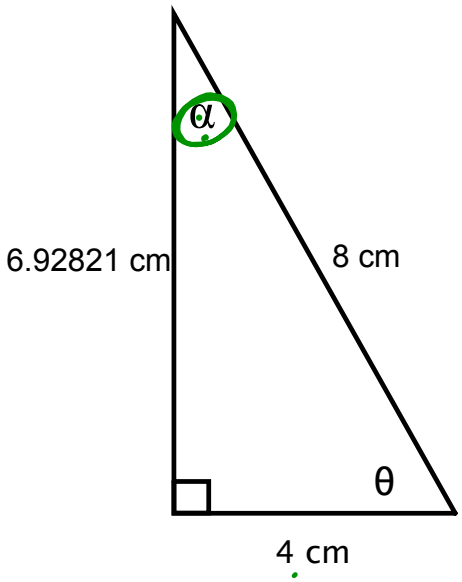
$$\text{sine of } \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\text{cosine of } \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\text{tangent of } \theta = \frac{\text{opposite}}{\text{adjacent}}$$




Use these ratios to solve for a missing side or angle.




$\sin\theta = \frac{6.92821}{8}$

$\cos\theta = \frac{4}{8}$

$\tan\theta = \frac{6.92821}{4}$

$\sin\alpha = \frac{4}{8}$

$\cos\alpha = \frac{6.92821}{8}$

$\tan\alpha = \frac{4}{6.9281}$

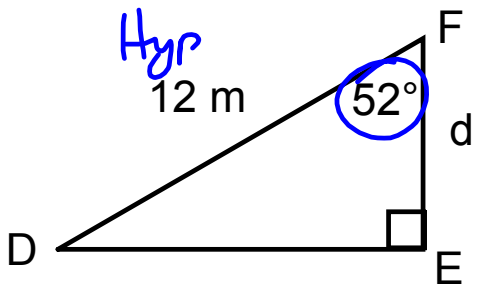
S o h C a h T o a

(Famous Japanese mathematician karate dojo guy!

## Solving Right Triangles

Recall: Trigonometric ratios can be used to determine side lengths or angle measures.

Ex.1 Calculate the height of the triangle shown below.



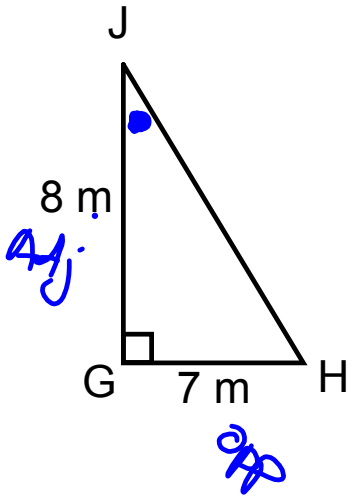

$12 \cdot \cos 52^\circ = \frac{d}{12} \cdot 12$

Adj $12 \cdot \cos 52^\circ = d$

$d \doteq 7.39$

∴ side d is 7.39 m

Ex.2 Determine the measure of angle J in the triangle shown below.




$\tan\theta = \frac{7}{8}$

$\tan^{-1}(\tan\theta) = \tan^{-1}\left(\frac{7}{8}\right)$

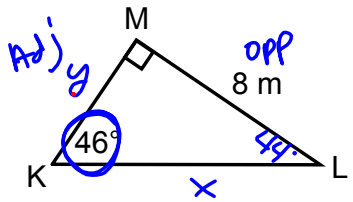
$\theta \doteq 41°$

$\therefore \angle J$ is $41°$

To **solve a triangle** means to find all the missing sides and angles.

For right triangles use Pythagorean Theorem and/or the primary trigonometric ratios.

Ex.3 Solve the triangle shown below.




$\angle L = 180° - 90° - 46°$

$\angle L = 44°$

$\frac{\sin 46°}{1} = \frac{8}{x}$

$8 \cdot \frac{1}{\sin 46} = \frac{x}{8} \cdot 8$

$\frac{8}{\sin 46} = x$

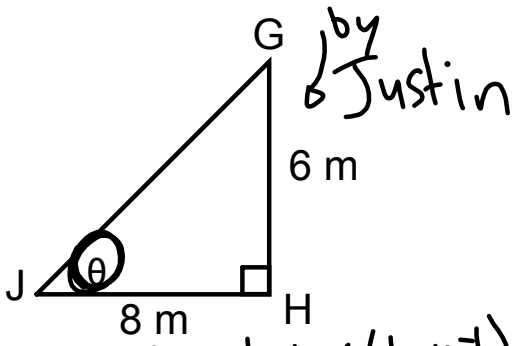
$x \doteq 11.12$

$\cos 46° = \frac{y}{11.12}$

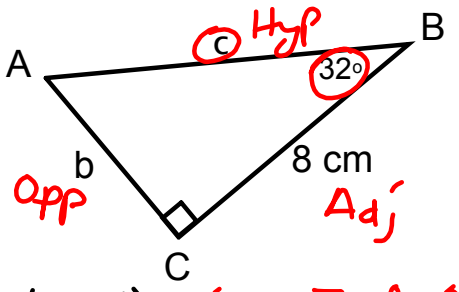
$\tan 46° = \frac{8}{y}$

$y \doteq 7.72$

Determine the missing angle or side using the trigonometric ratios. Round your lengths to two decimal places and angles to the nearest degree.




by Justin




$\tan\alpha = \frac{O}{A}$

$\tan\alpha = \frac{6}{8}$

$\tan\alpha(\tan^{-1}) = \frac{6}{8}(\tan^{-1})$

$\alpha \doteq 37.0$

$\therefore \angle J = 37°$

$\cos 32° = \frac{8}{c}$

$8 \cdot \frac{1}{\cos 32°} = \frac{c}{8} \cdot 8$

$8 \cdot \tan 32° = \frac{b}{8} \cdot 8$

$5 \doteq b$

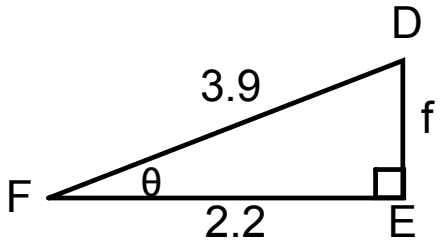
$b \doteq 5$

$\frac{8}{\cos 32°} = c$

$9.43 \doteq c$

$c \doteq 9.43$

Ex.2 Solve the triangle shown below




p.398 #8a,c,d,e, 9, 10, 11
p.404 #3, 5a, 8a, 10, 12